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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/751,506	01/06/2004	Chel-Woong Lee	0630-1899P	3337

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BIRCH STEWART KOLASCH & BIRCH  
PO BOX 747  
FALLS CHURCH, VA 22040-0747

EXAMINER
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BERTHEAUD, PETER JOHN

ART UNIT	PAPER NUMBER
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3746

DATE MAILED: 11/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/751,506

Applicant(s)

LEE ET AL.

Examiner

Peter J. Bertheaud

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Specification***

1. The disclosure is objected to because of the following informalities: On page 8, lines 16 and 17, the "stroke is detected by calculating with a sensorless method", if the stroke is indeed calculated, it would be determined, not "detected". On page 11, line 3, "predetermine" should be predetermined.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In the specification:

On page 3, line 17, the equation for velocity appears it may have inconsistency within its units. Although this equation is part of a reference to prior art, it must be enabled if it pertains to the claimed invention or simply removed if it is not significant.

On page 8, lines 3 and 4, it is stated that the voltage applied to the compressor is

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varied, and on page 9 lines 11 and 12, it is stated that the controller controls a stroke by varying a voltage, however this is not enabled as to how to make and/or use the invention. Also, on page 8, lines 13-15, enablement is missing on how the current is applied to the compressor and how the stroke is generated at the compressor. On page 8, lines 16 and 17, the "stroke is detected by calculating with a sensorless method", but it is not enabled how this is done. On page 8, lines 20-22, the mechanical resonant frequency is obtained by a method that includes averaging the value of the current multiplied by the stroke for one period, but it needs to be enabled how this period is defined. On page 11, lines 5-13, a stroke peak value, a current peak value, a stroke effective value, and a current effective value are referred to but there is no explanation as to what these terms exactly entail or the difference between the them.

Further explanation is needed in all of the above instances in order to fully enable the invention.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "current operation frequency" is used repeatedly throughout the claims including the two independent claims. This term is deemed indefinite because the word "current" has two common uses, one being current in the electrical sense, the other meaning present. Since current in the electrical sense is also used throughout, what is meant by "current operational frequency" can easily be

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misconstrued, changing not only the meaning, but the enablement, of the claims.

Therefore, the term "current operational frequency" should be corrected so as to clearly show its meaning, i.e., temporary or electrical.

6. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In line 2, it is stated that a stroke and a current are multiplied "according to a load state of the compressor". This is unclear because the modifier "according" does not properly describe how the current and the stroke are related to the load state of the compressor. Therefore a term such as "corresponding" would be a more appropriate modifier in this phrase.

7. The condition of the disclosure and of the claims does not permit a complete application of prior art as evidenced by the massive rejections under U.S.C. 112 1<sup>st</sup> and 2<sup>nd</sup> paragraph above. However, to the extent that the applicant could be understood, a search was performed and the following rejections are made. Applicant is cautioned that lack of rejections over prior art should not be interpreted as indication of allowability until the deficiencies noted in the rejections under U.S.C. 112 above are cured and resolved.

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. As best as can be understood given the indefiniteness of the claims. Claims 1-7, 9-11, 13, 14, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoo 6,851,934 in view of Yoo 6,685,438.

Yoo 6,851,934 discloses a compressor including, a mechanical resonant frequency calculating unit (140) for calculating a mechanical resonant frequency using a current and a stroke applied to a compressor (col. 3, lines 55-66 explain how 140 performs the same function); as well as a current detecting unit (110) for detecting a current applied to the compressor and a stroke detecting unit (120) for detecting a stroke generated from the compressor. Yoo 6,851,934 also discloses a second comparator (171) for comparing a stroke outputted from the stroke detecting unit and a stroke reference value (see col. 5, lines 47-49), as well as a controller (172 combined with 180) which compares a stroke outputted from the stroke detecting unit and a stroke reference value, varies a voltage applied to the compressor according to the comparison result, and thus controls a stroke (see col. 5, lines 49-52). Yoo 6,851,934 discloses that the operation frequency reference value determining unit determines a current operation frequency as an operation frequency reference value without varying a frequency if a size of the operation frequency is within a predetermined range of the mechanical resonant frequency (see col. 5, lines 18-25). Yoo 6,851,934 discloses the operation frequency reference determining unit increases/decreases a current operation frequency as much as a predetermined level if a size of the operation frequency is greater/smaller than the predetermined range of the mechanical resonant frequency (see col. 4, lines 12-25). Yoo 6,851,934 also discloses a method for controlling an

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operation of a reciprocating compressor comprising: detecting a current applied to a compressor and a stroke at certain period; calculating a mechanical resonant frequency, using the detected current and the stroke; determining an operation frequency reference value by decreasing/increasing a current operation frequency so as to be within a predetermined range of the calculated mechanical resonant frequency, and then driving a compressor with the operation frequency reference value (see col. 4, lines 12-25, col. 5, lines 61-67, and col. 6, lines 1-3). Yoo 6,851,934 discloses another step for the method comprising: determining a current operation frequency as an operation frequency reference value without varying a frequency if a current operation frequency is within a predetermined range of the mechanical resonant frequency; increasing a current operation frequency as much as a predetermined level if a current operation frequency is greater than a predetermined range of the mechanical resonant frequency, and then determining the increased operation frequency as an operation frequency reference value; and decreasing a current operation frequency as much as a predetermined level if a current operation frequency is smaller than a predetermined range of the mechanical resonant frequency, and then determining the decreased operation frequency as an operation frequency reference value (see col. 4, lines 49-67 and col. 5, lines 1-25). Yoo 6,851,934 discloses a method wherein the predetermined range of the mechanical resonant frequency is set to be proportional to a size of a stroke or a size of a current (see col. 4, lines 51-57). However Yoo 6,851,934 fails to show an operation frequency reference value determining unit for determining an operation frequency reference value within a predetermined range of the calculated

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mechanical resonant frequency; and a controller for comparing the determined operation frequency and a current operation frequency, and then variably controlling an operation frequency of the compressor according to the comparison result.

Furthermore, Yoo 6,851,934 fails to show a first comparator for comparing the operation frequency reference value and a current operation frequency, and outputting a difference value according to the comparison result. Yoo 6,851,934 fails to show a TDC detecting unit for detecting an upper limit point of a piston movement in a cylinder of the compressor, or a position at which a volume of the cylinder is minimized; wherein the controller compares a current TDC outputted from the TDC detecting unit and a TDC reference value, and, by applying a voltage to the compressor according to the comparison result, controls TDC feedback of a piston. Yoo 6,851,934 fails to show a method comprising: comparing the detected stroke and a stroke reference value, and varying a voltage applied to a compressor according to the comparison result thereby controlling a stroke feedback, or comparing a current TDC detected from the compressor and a TDC reference value, and varying a voltage applied to the compressor according to the comparison result thereby controlling a TDC feedback of a piston.

Yoo 6,685,438 teaches a linear type reciprocating compressor (240) including, an operation frequency reference value determining unit (212) for determining an operation frequency reference value within a predetermined range of the calculated mechanical resonant frequency (col. 4, lines 45-50 explain how 212 performs the same function); and a controller (220) for comparing the determined operation frequency and

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a current operation frequency, and then variably controlling an operation frequency of the compressor according to the comparison result (see col. 5 lines 55-62). Yoo 6,685,438 also teaches a first comparator (221) for comparing the operation frequency reference value and a current operation frequency, and outputting a difference value according to the comparison result (see col. 5 lines 55-62). Yoo 6,685,438 further teaches a TDC detecting unit (212) for detecting an upper limit point of a piston movement in a cylinder of the compressor, or a position at which a volume of the cylinder is minimized (see col. 4, lines 45-52); wherein the controller (220) compares a current TDC outputted from the TDC detecting unit and a TDC reference value, and, by applying a voltage to the compressor according to the comparison result, controls TDC feedback of a piston (see col. 5 lines 55-62). Yoo 6,685,438 teaches a method comprising: comparing the detected stroke and a stroke reference value, and varying a voltage applied to a compressor according to the comparison result thereby controlling a stroke feedback, or comparing a current TDC detected from the compressor and a TDC reference value, and varying a voltage applied to the compressor according to the comparison result thereby controlling a TDC feedback of a piston (see col. 5, lines 55-62). Yoo 6,685,438 further teaches that these aspects of the invention would be advantageous because an operation point of the compressor can be placed within a high efficiency operation region by using a phase difference between a piston speed and a current and varying an operation frequency according to a load variation.

Therefore, it would have been obvious to one skilled in the art at the time of invention to modify the reciprocating compressor of Yoo 6,851,934 by adding the above

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elements, as taught by 6,685,438, in order to place an operation point of the compressor within a high efficiency operation region by using a phase difference between a piston speed and a current and varying an operation frequency according to a load variation (see col. 2, lines 25-31).

### ***Conclusion***

10. The prior art made of record, in the attached form 892, and not relied upon is considered pertinent to applicant's disclosure.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J. Bertheaud whose telephone number is (571) 272-3476. The examiner can normally be reached on M-F 9am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ehud Gartenberg can be reached on (571) 272-4828. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



PJB



**EHUD GARTENBERG**  
**SUPERVISORY PATENT EXAMINER**